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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. |
|-----------------|-------------|----------------------|---------------------|
| 09/631,491 | 08/03/00 | MAEDA | T 5576-131 |

000826
ALSTON & BIRD LLP
BANK OF AMERICA PLAZA
101 SOUTH TRYON STREET, SUITE 4000
CHARLOTTE NC 28280-4000

IM52/0928

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| EXAMINER |
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WILKINS III, H

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| ART UNIT | PAPER NUMBER |
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1742

DATE MAILED: 09/28/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/631,491

Applicant(s)

MAEDA ET AL.

Examiner

Harry D Wilkins, III

Art Unit

1742

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 and 12-16 is/are pending in the application.
- 4a) Of the above claim(s) 13-15 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-7, 12 and 16 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 August 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☒ Other: attached spreadsheet.

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-7, 12 and 16, drawn to a hydrogen storage alloy and a nickel-metal hydride battery made from the hydrogen storage alloy, classified in class 148, subclass 426.
 - II. Claims 13-15, drawn to a method of manufacturing a hydrogen storage alloy, classified in class 148, subclass 555.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the process can make a materially different product, i.e.-one which does not contain 24 to 33 wt% La.
3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.
4. During a telephone conversation with Melissa Pendleton on 24 September 2001 a provisional election was made with traverse to prosecute the invention of I, claims 1-7, 12 and 16. Affirmation of this election must be made by applicant in replying to this

Office action. Claims 13-15 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

5. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a petition under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 1, 6 and 16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "CaCu₅ type" in claims 1, 6 and 16 is vague and indefinite as to the scope of the claims, see Ex parte Attig 7 USPQ 2d 1092 (BPAI, 1988); Ex parte Copenhagen 109 USPQ 118 (BPAI).

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1, 7, 12 and 16 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Visintin et al (XP000964596).

Visintin et al anticipate the claimed hydrogen storage alloy. Visintin et al teach (see page 1985, lines 2-4) a hydrogen storage alloy which contains La and Ca at 26.1 wt% and 0.94 wt% respectively. See attached sheet for alloy composition breakdown. The alloy has AB₅ crystal structure (i.e.-CaCu₅ crystal structure).

Regarding claim 7, Visintin et al teach (see page 1985) that the sample with less Ca (i.e.-sample 1) has lattice parameters of $a=5.030 \text{ \AA}$ and $c=4.046 \text{ \AA}$.

Regarding claim 12, Visintin et al teach a hydrogen storage alloy which is based on the formula $\text{La}_u\text{R}_v\text{Ca}_w\text{Ni}_x\text{Co}_y\text{M}_z$, where R is Ce and M is Mn and Al. $(x+y+z)/(u+v)$ for Visintin et al is 5 which is within the claimed range $((3.55+0.75+0.7)/(0.8+0.2)=5/1=5)$.

Regarding claim 16, Visintin et al teach (see page 1985) that electrodes were created from the alloys. Visintin et al disclose (see page 1983) that Ni/MHx batteries contain a highly reversible hydrogen electrode. This electrode is made from hydrogen storage alloys.

10. Claims 1,2,4-7, 12 and 16 rejected under 35 U.S.C. 102(b) as being clearly anticipated by Yanagihara et al (JP 60-250557 A).

Yanagihara et al anticipate the claimed hydrogen storage alloy. Yanagihara et al teach (see page 296) several hydrogen storage alloys including $\text{La}_{0.9}\text{Ca}_{0.1}\text{Ni}_{4.5}\text{Co}_{0.5}$ (Ex 2) and $\text{LaNi}_3\text{Co}_{1.7}\text{Mg}_{0.3}$ (Ex 8). These alloys contain La at 29.6 wt% and 32.9 wt% respectively. The first alloy contains 0.95 wt% Ca and the second alloy contains 1.73 wt% Mg.

| Element | Visintin | Weight | Weight % | JP Ex 2 | Weight | Weight % | JP Ex 8 | Weight | Weight % | Boter | Weight | Weight % |
|---------|----------|-----------|-----------|---------|-----------|-----------|---------|----------|----------|-------|----------|----------|
| La | 0.8 | 111.1244 | 26.098569 | 0.9 | 125.01495 | 29.58166 | 1 | 138.9055 | 32.87987 | 0.895 | 124.3204 | 29.49992 |
| Ce | 0.2 | 28.024 | 6.5816895 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nd | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mg | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 7.2915 | 1.725947 | 0 | 0 | 0 |
| Ca | 0.1 | 4.0078 | 0.941268 | 0.1 | 4.0078 | 0.9483456 | 0 | 0 | 0 | 0.105 | 4.20819 | 0.998559 |
| Ni | 3.55 | 208.36157 | 48.935596 | 4.5 | 264.1203 | 62.497461 | 3 | 176.0802 | 41.67937 | 4.8 | 281.7283 | 66.85114 |
| Al | 0.3 | 8.094462 | 1.9010575 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Co | 0.75 | 44.1999 | 10.380746 | 0.5 | 29.4666 | 6.9725336 | 1.7 | 100.1864 | 23.71481 | 0 | 0 | 0 |
| Mn | 0.4 | 21.9752 | 5.1610742 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Fe | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 11.1694 | 2.65038 |
| Total | | 425.78733 | 100 | | 422.60965 | 100 | | 422.4636 | 100 | | 421.4263 | 100 |

Regarding claim 2, Example alloy 2 contains 6.97 wt% Co.

Regarding claim 4, Example alloy 2 contains 6.97 wt% Co and the ratio B/A is 5.0.

Regarding claim 5, Yanagihara et al teach (see English abstract) that the M metal can be selected from "at least one of" a list of metals. Among the metals on this list is V. The disclosure indicates that mixtures of metals for the formula for M are within the scope of Yanagihara et al. Therefore, Yanagihara et al teach adding V to the hydrogen storage alloy even though no specific example contains Ca or Mg while also containing V.

Regarding claims 6 and 7, with respect to the property of crystal lattice constants, the alloy composition taught by Yanagihara et al overlaps the alloy composition recited in the claims. The method of making described by Yanagihara et al (see page 296, upper right, orally translated by USPTO) includes arc melting in an Ar atmosphere followed by casting to form an ingot. This method is substantially similar to the method of the present invention. Therefore, one of ordinary skill in the art would have expected that the products taught by the reference would inherently have the same crystal lattice constants as claimed because the alloy has an identical composition and is made by a substantially similar method.

"Where the claimed and prior art products are identical or substantially identical in structure or composition or are produced by identical or substantially identical processes, a prima facie case of either anticipation or obviousness has been established, In re Best 195 USPQ 430, 433 (CCPA 1977). 'When the PTO shows a sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing they are not.' In re Spada, 15 USPQ2d 1655, 168 (Fed. Cir. 1990). Therefore, the prima facie case can be rebutted by evidence showing that the prior art products do not necessarily possess the characteristics of the claimed product. In re Best 195 USPQ 430, 433 (CCPA 1977)." See MPEP 2112.01

Regarding claim 12, Yanagihara et al teach a hydrogen storage alloy which is based on the formula $\text{La}_u\text{R}_v\text{Mg}_w\text{Ni}_x\text{Co}_y\text{M}_z$ or $\text{La}_u\text{R}_v\text{Ca}_w\text{Ni}_x\text{Co}_y\text{M}_z$, where v is 0 and z is 0. $(x+y+z)/(u+v)$ for Yanagihara et al in Example 2 is 5.0 which is within the claimed range $((4.5+0.5+0)/(1.0+0)=5/1=5)$.

Regarding claim 16, Yanagihara et al teach (see English abstract) that a battery is made from an electrode that is made from the hydrogen storage alloy disclosed therein.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 1, 2, 3, 7, 12 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boter (US 4,004,943).

Boter teaches (see col 1, lines 34-44) a hydrogen storage alloy which is represented by $\text{La}_{1-y}\text{R}_y\text{Ni}_{5-z}\text{M}_z$. R is selected from rare earth metals, Ca and Th. M is selected from Co, Fe and Cu. The alloy has the conditions $0 < y < 1$ and $0 < z < 1$. Boter teaches that when M is Fe, $z < 0.2$. Therefore, Boter teaches an alloy $\text{La}_{1-y}\text{R}_y\text{Ni}_{4.8}\text{Fe}_{0.2}$. Boter teaches a broad range which contains the presently claimed composition. If R is selected as being Ca, and y is selected within the disclosed range to be about 0.1, the alloy contains 29.6 wt% La and 0.95 wt% Ca.

Therefore, it would have been obvious to one of ordinary skill in the art to have selected a composition within the broadly disclosed composition of Boter in order to optimize the hydrogen storage properties. (It is well known in the art that the composition greatly affects the hydrogen storage properties of hydrogen storage alloys).

Regarding claims 2 and 3, the specific teaching of an alloy containing $\text{La}_{1-y}\text{R}_y\text{Ni}_{4.8}\text{Fe}_{0.2}$ shows an alloy with zero content of Co.

Regarding claim 7, with respect to the property of crystal lattice constants, the alloy composition taught by Boter overlaps the alloy composition recited in the claims. At the time the invention was made the conventional method for creating alloys included the process of melting the constituent metals in a furnace under an Ar atmosphere and casting melt. This method is substantially similar to the method of the present invention. Therefore, one of ordinary skill in the art would have expected that the products taught by the reference would have the same crystal lattice constants as claimed because the alloy has an identical composition and is made by a substantially similar method.

Regarding claim 12, Boter teaches a hydrogen storage alloy which is based on the formula $\text{La}_u\text{R}_v\text{Ca}_w\text{Ni}_x\text{Co}_y\text{M}_z$, where v is 0, y is 0 and M is Fe. $(x+y+z)/(u+v)$ for Boter would have been expected to be between 5.0 and 5.25 because the value for u is $(1-w)$ and $x+z=5.0$. When an appropriate alloy had been selected to optimize hydrogen storage properties that was within the claimed range, u would be in the range 0.895 to 0.989 which yields $(x+y+z)/(u+v)$ ratio of 5.055 to 5.587. This range overlaps the presently claimed range.

Regarding claim 16, Boter teaches (see abstract) that an electrode in a nickel metal hydride battery is made using the alloy disclosed therein.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry D Wilkins, III whose telephone number is 703-305-9927. The examiner can normally be reached on M-F 8:15am-4:45pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy V King can be reached on 703-308-1146. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Harry D Wilkins, III
Examiner
Art Unit 1742

hdw
September 27, 2001


ROY KING
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700